LARGE-DIAMETER WAFER ESTIMATING METHOD

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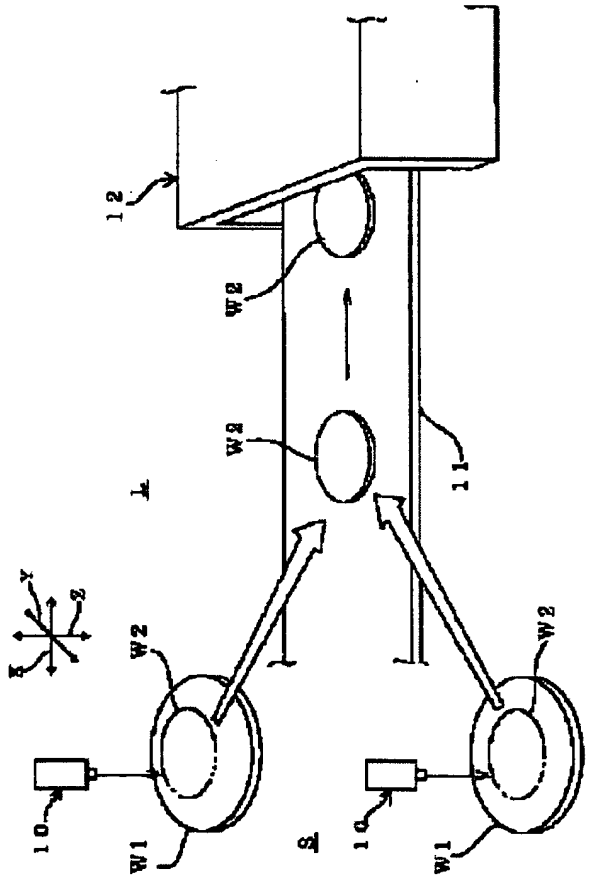
Abstract of **JP2000332078**

PROBLEM TO BE SOLVED: To utilize a small-diameter wafer estimating line for estimating a large-diameter wafer. SOLUTION: By cutting a large-diameter wafer W1 of 300 mm diameter, a small-diameter wafer W2 of 200 mm diameter is created. Thereafter, by transferring the obtained small-diameter wafer W2 onto a line conveyer 11 of an evaluating line L for the wafers of 200 mm, its necessary evaluating tests are performed in various wafer evaluation apparatuses 12 provided successively on this line L. In this way, the evaluation of the large-diameter wafer W1 can be performed by the existent evaluating line L for the wafers of 200 mm which is provided in factory, etc. Additionally at cutting, the large-diameter wafer W2 is cut with a laser beam to make its cutting workability improvable.



*NOTICES *

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The evaluation approach of the diameter wafer of macrostomia equipped with the process which produces the diameter wafer of macrostomia, the process which cuts a small aperture wafer from the produced diameter wafer of macrostomia, and the process which perform an evaluation trial about the small aperture wafer obtained by cutting.
[Claim 2] The evaluation approach of the diameter wafer of macrostomia according to claim 1 that the above-mentioned diameter wafer of macrostomia is a silicon wafer with a diameter of 300mm.
[Claim 3] The evaluation approach of the diameter wafer of macrostomia according to claim 1 or 2 which adopted the cutting method which irradiates a laser beam as the processing approach which cuts the above-mentioned diameter wafer of macrostomia into a small aperture wafer.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention cuts the evaluation approach of the diameter wafer of macrostomia, and the diameter wafer of macrostomia with which the evaluation technique and the facility are not established in detail, for example, yet, into the small aperture wafer with which the evaluation technique and the facility are already established, and relates to the evaluation approach of the diameter wafer of macrostomia of performing a predetermined wafer evaluation trial.
[0002]
[Description of the Prior Art] As for the semiconductor material, especially the silicon wafer, diameter-ization of macrostomia is progressing, and, as for the current mainstream, that it was around [whose] 1965 before and after the diameter of 1 inch has shifted to the diameter of 8 inches (200mm) from the diameter of 6 inches. Around 2000, it is expected by the pan that mass-production initiation of the silicon wafer with a diameter of 300mm is carried out. A wafer of the diameter of macrostomia which is not until now called such a 300mm wafer more than faces appearing, it is necessary to enlarge various kinds of equipments, for example, ingot raising equipment, included in a wafer production line, wrapping equipment, wafer polish equipment, etc., and various problems which coil round this surface.
[0003] On the other hand, even if such a problem is in various kinds of wafer evaluation equipments for evaluating the quality of the silicon wafer after manufacture etc., it is the same. Namely, current, various kinds of wafer evaluation equipments which have appeared on the market in the commercial scene as an object for 200mm wafers, For example, the wafer flatness measuring device by the electrostatic-capacity measuring method, thickness measurement equipment by the ellipsometry method (polarization analysis), The life time measuring device by the additive eddy current, the defective evaluation equipment by the reflective microwave method, originally the equipment which measures electrical characteristics, such as silicon defective evaluation equipment, oxide-film proof-pressure measurement, etc. which furthermore used laser spectroscopy, by TEG (Test Element Group) can evaluate 300mm wafer of this diameter of macrostomia -- as -- it is not designed.
[0004]
[Problem(s) to be Solved by the Invention] Conventional wafer evaluation Rhine where these wafer evaluation equipments of various kinds of were arranged in on Rhine is for 200mm wafers. Therefore, in order to have corresponded to this 300mm wafer, it had to wait for technical establishment of evaluation Rhine for 300mm wafers which still has development in a halfway phase. And also after such evaluation Rhine for 300mm wafers was developed, by the wafer manufacture manufacturer and the device manufacturer, it was obliged to the purchase of the large-sized evaluation equipment considered to be very expensive, and it was expected that it was forced plant-and-equipment investment great for quality control of 300mm wafer.
[0005] Then, when taking the cure from a wafer [of cutting 300mm wafer of the diameter of macrostomia into 200mm wafer of small aperture] side, this artificer did the knowledge of the ability to execute evaluation of 300mm wafer by proxy using conventional 200mm wafer evaluation Rhine, and completed this invention. In addition, as other processing approaches which carry out aperture contraction of the diameter wafer of macrostomia, beveling processing of for example, the wafer periphery section is applied, and it is also considered that even 200mm wafer processes 300mm wafer gradually. Moreover, there is a method of beginning to delete an ingot to small aperture. However, by which such aperture contraction approach, floor to floor time becomes long too much, and a loss becomes great, and it is lacking in practicality.

[0006]
[Objects of the Invention] This invention sets it as that purpose to offer the evaluation approach of the diameter wafer of macrostomia that evaluation Rhine for small aperture wafers can be used for evaluation of the diameter wafer of macrostomia. Moreover, this invention sets it as that purpose to offer the evaluation approach of the diameter wafer of macrostomia which can raise the workability of wafer cutting.
[0007]
[Means for Solving the Problem] Invention according to claim 1 is the evaluation approach of the diameter wafer of macrostomia equipped with the process which produces the diameter wafer of macrostomia, the process which cuts a small aperture wafer from the produced diameter wafer of macrostomia, and the process which performs an evaluation trial about the small aperture wafer obtained by cutting.
[0008] The material of the diameter wafer of macrostomia is not limited. For example, silicon, gallium arsenide, a quartz, various kinds of ceramics, etc. are mentioned. The diameter of the diameter wafer of macrostomia is not limited. For example, 300mm or more than it is sufficient. The diameter of a small aperture wafer is not limited, either. For example, less than [200mm or it] is sufficient. However, it must be the magnitude which can evaluate convenient using existing wafer evaluation equipment.
[0009] The cutting approach of a wafer is not limited. For example, the cutting method with sufficient cutting efficiency, the water jet intercept method which does not give a heat damage to a wafer like this cutting method are mentioned like a rotary knife intercept method and claim 3. Moreover, the number of sheets which cuts out a small aperture wafer from one diameter wafer of macrostomia is not limited, either. If many small aperture wafers are cut out from one diameter wafer of macrostomia regardless of the size of a diameter, the reliability of evaluation of that part and this diameter wafer of macrostomia will increase. The class of equipment used for the evaluation trial of a wafer is not limited. For example, silicon defective evaluation equipment, an oxide-film proof-pressure measuring device, a resistivity measuring device, etc. are

mentioned to various kinds of wafer flatness measuring devices, wafer surface-analysis equipment, thickness measurement equipment, a life time measuring device, defective evaluation equipment, and a pan.

[0010] Invention of claim 2 is the evaluation approach of the diameter wafer of macrostomia according to claim 1 that the above-mentioned diameter wafer of macrostomia is a silicon wafer with a diameter of 300mm.

[0011] Invention of claim 3 is the evaluation approach of the diameter wafer of macrostomia according to claim 1 or 2 which adopted the cutting method which irradiates a laser beam as the processing approach which cuts the above-mentioned diameter wafer of macrostomia into a small aperture wafer. The form of the laser-beam-cutting equipment used for the cutting method is not limited. In addition, as laser-beam-cutting equipment used for the cutting method, for example, the ruby laser cutting equipment as fixed laser-beam-cutting equipment besides various kinds of gas laser cutting equipments, such as carbon dioxide gas laser, Nd(neodium):YAG (yttrium aluminum garnet) laser-beam-cutting equipment, X-ray laser-beam-cutting equipment, etc. are mentioned, for example.

[0012]

[Function] According to this invention, the diameter wafer of macrostomia is cut, it considers as a small aperture wafer, and various kinds of wafer evaluation trials are performed about this small aperture wafer. This becomes possible using evaluation Rhine for the existing small aperture wafers to evaluate the diameter wafer of macrostomia.

[0013] Since the diameter wafer of macrostomia is especially cut by the laser beam according to invention according to claim 3, the workability of wafer cutting can be raised.

[0014]

[Embodiment of the Invention] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 1 is the flow chart of the evaluation approach of the diameter wafer of macrostomia concerning one example of this invention. Beforehand, the silicon wafer (diameter wafer of macrostomia) W1 with a diameter of 300mm is produced by the general wafer manufacture approach. orientation flat processing (OF processing) prolonged in the direction of an axis in a part of each block peripheral face after specifically cutting a single-crystal-silicon ingot with a diameter of 305-310mm which was able to be pulled up by the CZ process to two or more ingot blocks and performing cylindrical grinding subsequently to each ingot block, or notch processing -- giving -- each after that and ingot block -- slicing equipments, such as a wire saw, -- many -- it slices to several wafers. And about each wafer, beveling of the wafer periphery section and wrapping on the rear face of a wafer table are performed, etching by the mixed acid is performed further, the damage on the rear face of a wafer table to a wrapping process is removed, mirror polishing of the wafer front face is carried out continuously, and the diameter wafer W1 of macrostomia with 750-800 micrometers [in thickness] and a diameter of 300mm is produced by carrying out the last washing.

[0015] As shown in drawing 1 , the diameter wafer W1 of macrostomia produced in this way is sent with the cutting process to a small aperture wafer next. That is, the diameter wafer W1 of macrostomia with a diameter of 300mm positioned on this cutting stage S fixes to the X-Y table outside drawing, and is cut into the small aperture wafer W2 with a diameter of 200mm by the laser beam of high power (250W and 300Hz) irradiated from that laser light-emitting part using the Nd(neodium):YAG (yttrium aluminum garnet) laser-beam-cutting equipment 10 which can carry out circle migration of the XY flat-surface top. In addition, this drawing 1 shows two examples of the approach of cutting the location which carried out eccentricity from the central point of the diameter wafer W1 of macrostomia as the wafer central point as the cutting approach of the small aperture wafer W2, and the approach of cutting the central point of the diameter wafer W1 of macrostomia as a wafer core. For example, the location of the small aperture-ized process by laser is not limited. Small aperture may be formed with laser after a slice, wafer processing may be performed conventionally after that in 8phi Rhine, and a crystal defect may be evaluated.

[0016] In the evaluation which the processing damage of cutting influences, it lets usual 200mm processing Rhine pass, and a damage is removed. Even in this case, a problem is not produced when performing crystal characterization. In this way, the cut small aperture wafer W2 is making a Z direction go up and down the transfer equipment outside drawing, and making it move in the XY direction, and is transferred on the Rhine conveyor 11 arranged in existing evaluation Rhine L for 200mm wafers. Then, required wafer evaluation is performed by various kinds of wafer evaluation equipments 12 arranged on this evaluation Rhine L for 200mm wafers (evaluation Rhine for small aperture wafers). The wafer periphery section may be again beveled before an evaluation equipment injection if needed (the damage removal by laser beam machining is included). In addition, as wafer evaluation equipment 12 here, the wafer flatness measuring device mentioned above, wafer surface-analysis equipment, thickness measurement equipment, a life time measuring device, defective evaluation equipment, silicon defective evaluation equipment, an oxide-film proof-pressure measuring device, a resistivity measuring device, etc. are adopted.

[0017] Thus, since the diameter wafer W1 of macrostomia is cut, it considers as the small aperture wafer W2 and it was made to perform various kinds of wafer evaluation trials about this small aperture wafer W2, the diameter wafer W1 of macrostomia can be evaluated using existing evaluation Rhine L for 200mm wafers. Moreover, in this one example, since the diameter wafer W1 of macrostomia was cut by the laser beam in which cutting processing is easy and high-speed, and possible, the workability of this wafer cutting can be raised.

[0018]

[Effect of the Invention] Since according to this invention it constituted so that an evaluation trial might be performed about the small aperture wafer which cut the diameter wafer of macrostomia and was obtained, evaluation Rhine for small aperture wafers can be used for evaluation of the diameter wafer of macrostomia.

[0019] Since the cutting method was especially adopted as cutting of the diameter wafer of macrostomia according to invention according to claim 3, the workability of wafer cutting can be raised.

[Translation done.]